

SOIL WATER

by

D. R. Neilsen (Chairman), R. D. Jackson
J. W. Cary and D. D. Evans, Editors

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SOIL WATER

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Library of Congress Card Number: 71-188846

PREFACE

This book represents a culmination of efforts begun in a small way more than two decades ago at the start of the federal-state program in agricultural research (under the Research and Marketing Act of 1946) known popularly among agriculturists as "regional research". The W-9 technical committee formed under this program and activated in 1949 (Irrigation and Soil Management Studies including Drainage, Salinity and Fertilization) included a few soil physicists who were interested in water flow in relation to irrigation and drainage. These interests in water flow were continued and expanded in 1954 with organization of a new project, W-29 (Soil-Water-Plant Relationships under irrigation), and the addition of a few more soil physicists.

In 1957 at Tucson, Arizona, where committees were preparing project revisions and responding to requests of the Western Experiment Station Directors for narrowing of project objectives, a small group of soil physicists discussed ways to continue cooperative research work specifically on water flow without competing seriously with other projects for the limited funds available. At this time many of the soil physicists involved had adequate grant support from other sources and did not seriously need support from regional research funds. However, all present testified to the considerable value of the extended discussions of research work and the benefits of constructive criticism realized in technical committee meetings. The atmosphere of free and open discussion which existed and the generous time available for discussion promoted exciting debate, unequaled in any other scientific meeting, and all agreed that ideas born and developed here were of inestimable value. The *esprit de corps* of the group was high and an extraordinary sense of accomplishment brought about through shared understanding pervaded. In this atmosphere was born the idea for technical committees with funds sufficient only to guarantee continuation of cooperative work and annual discussions. A project outline was developed, submitted and approved, with funds allotted during the first few years of this project amounting to about \$600 per participant. (Greater amounts have been available as needed by some cooperators in more recent years, particularly after the project was revised in 1964.)

Looking back, those involved in this project agree that annual meetings of the cooperating scientists have helped to rectify the stultifying effect of isolation prevalent in a subject matter field where many teaching or research institutions and organizations are able to support only a single specialists. Furthermore, graduate students and technicians at locations where meetings have been held have been avid supporters of such conferences because of the opportunity provided for expansion of ideas from contact with scientists working in different places and having somewhat different backgrounds and interests. The consequent stimulation of scientific effort and elimination of waste which results from sharing of ideas represent an incalculable saving of talent, funds and facilities. Further gains from cooperative work are expected from presentation of information in this book.

This discussion of water flow in unsaturated soil contains a distillation of ideas and data from the minds and laboratories of the soil physicists who have contributed, through discussion and written reports, over the period of these projects, but particularly in the past half dozen years. Although the discussion is dominated by ideas of the participants, the influence of scientific ideas from all over the world is acknowledged.

The level of discussion in the book has been set for technicians and graduate students because of the committee's conviction that this is the area of greatest educational need. As pointed out in the first chapter, soil water is of profound importance. It is an essential link in all food and fiber production. If it were not for the movement of water within soil, wells and springs would be eternally dry. The retention and movement of water within soil determines whether or not flooding occurs. Because of its effects on vegetation and soil-heat capacity, soil water is even important in local weather modification. The basic concepts developed on the following pages will be of material benefit and stimulation to the many persons interested in flow of water in unsaturated soil.

—The Editors

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